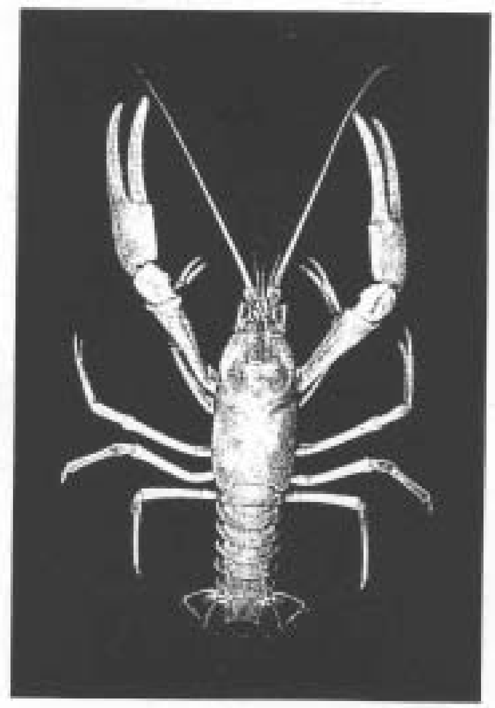
Conservation Assessment
for
Greenbrier Cave Crayfish (Cambarus nerterius)



(From Pflieger, 1996)

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This Conservation Assessment was prepared to compile the published and unpublished information on Cambarus nerterius. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject community and associated taxa, please contact the Eastern Region of the Forest Service Threatened and Endangered Species Program at 310 Wisconsin Avenue, Milwaukee, Wisconsin 53203.

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EXECUTIVE SUMMARY

The Greenbrier cave crayfish is designated as a Regional Forester Sensitive Species on the Monongahela National Forest in the Eastern Region of the Forest Service. The purpose of this document is to provide the background information necessary to prepare a Conservation Strategy, which will include management actions to conserve the species.

The Greenbrier cave crayfish is an obligate cavernicole that occurs in subterranean habitats in Greenbrier and Pocahontas counties, West Virginia, where it has been reported from 11 caves.

NOMENCLATURE AND TAXONOMY

Classification: Class Crustacea
Order Decapoda
Family Cambaridae

Scientific name: <u>Cambarus</u> <u>nerterius</u>

Common name: Greenbrier cave crayfish

Synonyms: none

This species was described by Hobbs (1964). The description was repeated by Hobbs, et al. (1977), and distribution and ecological data was also summarized therein.

DESCRIPTION OF SPECIES

The Greenbrier cave crayfish is a lightly pigmented, pale tan or bluish crayfish with reduced eyes that are pigmented and possess a faceted cornea, and somewhat elongate pincers. Identification of this species with certainty requires a specialist familiar with the taxonomy of crayfish.

LIFE HISTORY

Hobbs, et al. (1977) reported that form I males (reproductively mature) have been collected from June through September. The only reported ovigerous female was found in May.

HABITAT

<u>Cambarus</u> <u>nerterius</u> is an obligate inhabitant of subterranean waters. Although this species does not exhibit the radical changes in morphology seen in other cave crayfish (lack of pigmentation and eyes), it has never been found in surface waters, except for one spring stream associated with a cave entrance. Within caves it is typically found in streams (Holsinger, et al., 1976; Hobbs, et al., 1977).

DISTRIBUTION AND ABUNDANCE

This species is known only from Greenbrier and Pocahontas counties, West Virginia. Holsinger, et al. (1976) reported that in the caves from which it is known the crayfish are usually uncommon.

RANGEWIDE STATUS

Global Rank: G2 imperiled; The global rank of G2 is assigned for species that are known from 6-20 localities. Holsinger, et al. (1976) reported this species from 11 collection sites.

West Virginia State Rank: S2 imperiled; The state rank of S2 is assigned for species that are known from 6-20 localities. All of the 11 known localities are in West Virginia.

POPULATION BIOLOGY AND VIABILITY

Holsinger, et al. (1976) reported that Cambarus nerterius sometimes occurred in the same cave as Cambarus bartonii, although the two species never occurred syntopically.

POTENTIAL THREATS

Due to the presence of Cambarus nerterius in the restricted cave environment, it is susceptible to a wide variety of disturbances (Elliott, 1998). Caves are underground drainage conduits for surface runoff, bringing in significant quantities of nutrients for cave communities. Unfortunately, contaminants may be introduced with equal ease, with devastating effects on cave animals. Potential contaminants include (1) sewage or fecal contamination, including sewage plant effluent, septic field waste, campground outhouses, feedlots, grazing pastures or any other source of human or animal waste (Harvey and Skeleton, 1968; Quinlan and Rowe, 1977, 1978; Lewis, 1993; Panno, et al 1996, 1997, 1998). A population of a related cave crayfish, Cambarus setosus, may have been extirpated by sewage pollution (Marquart, 1979). (2) pesticides or herbicides used for crops, livestock, trails, roads or other applications; fertilizers used for crops or lawns (Keith and Poulson, 1981; Panno, et al. 1998); (3) hazardous material introductions via accidental spills or deliberate dumping, including road salting (Quinlan and Rowe, 1977, 1978; Lewis, 1993, 1996). A November, 1977 fertilizer spill resulting from a broken pipeline killed hundreds of the related crayfish Cambarus hubrichti, cavefish and other animals in the Meramec Spring conduit, Missouri (Gardner, 1986).

Habitat alteration due to sedimentation is a pervasive threat potentially caused by logging, road or other construction, trail building, farming, or any other kind of development that disturbs groundcover. Sedimentation potentially changes cave habitat, blocks recharge sites, or alters flow volume and velocity. Keith (1988) reported that pesticides and other harmful compounds like PCB’s can adhere to clay and silt particles and be transported via sedimentation.

Impoundments may detrimentally affect cave species. Flooding makes terrestrial habitats unusable and creates changes in stream flow that in turn causes siltation and drastic modification of gravel riffle and pool habitats. Stream back-flooding is also another potential source of introduction of contaminants to cave ecosystems (Duchon and Lisowski, 1980; Keith, 1988).

Smoke is another potential source of airborne particulate contamination and hazardous material introduction to the cave environment. Many caves have active air currents that serve to inhale surface air from one entrance and exhale it from another. Potential smoke sources include campfires built in cave entrances, prescribed burns or trash disposal. Concerning the latter, not only may hazardous chemicals be carried into the cave environment, but the residue serves as another source of groundwater contamination.

Numerous caves have been affected by quarry activities prior to acquisition. Roadcut construction for highways passing through national forest land is a similar blasting activity and has the potential to destroy or seriously modify cave ecosystems. Indirect effects of blasting include potential destabilization of passages, collapse and destruction of stream passages, changes in water table levels and sediment transport (Keith, 1988).

Oil, gas or water exploration and development may encounter cave passages and introduce drilling mud and fluids into cave passages and streams. Brine produced by wells is extremely toxic, containing high concentrations of dissolved heavy metals, halides or hydrogen sulfide. These substances can enter cave ecosystems through breach of drilling pits, corrosion of inactive well casings, or during injection to increase production of adjacent wells (Quinlan and Rowe, 1978).

Cave ecosystems are unfortunately not immune to the introduction of exotic species. Out-competition of native cavernicoles by exotic facultative cavernicoles is becoming more common, with species such as the exotic milliped Oxidus gracilis affecting both terrestrial and aquatic habitats.

With the presence of humans in caves comes an increased risk of vandalism or littering of the habitat, disruption of habitat and trampling of fauna, introduction of microbial flora non-native to the cave or introduction of hazardous materials (e.g., spent carbide, batteries). The construction of roads or trails near cave entrances encourages entry.

SUMMARY OF LAND OWNERSHIP AND EXISTING HABITAT PROTECTION

Besides its distribution on the Monongahela National Forest, Cambarus nerterius is also known in General Davis Cave, which is owned and gated by The Nature Conservancy.

SUMMARY OF MANAGEMENT AND CONSERVATION ACTIVITIES

No species specific management or conservation activities are being conducted concerning Cambarus nerterius.

The existing (1985) Monongahela Land and Resource Management Plan does not provide management direction for caves although they are being considered in the Forest Plan revision currently underway. A Forest Plan Amendment in progress for Threatened and Endangered Species will include management for the caves on the forest.

RESEARCH AND MONITORING

No species specific monitoring is being conducted concerning Cambarus nerterius.

RECOMMENDATIONS

Retain on list of Regional Forester Sensitive Species.

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